Journal of Personality and Social Psychology

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Online First Publication, January 31, 2011. doi: 10.1037/a0022407

CITATION

Sheldon, K. M., Abad, N., & Hinsch, C. (2011, January 31). A Two-Process View of Facebook Use and Relatedness Need-Satisfaction: Disconnection Drives Use, and Connection Rewards It. *Journal of Personality and Social Psychology*. Advance online publication. doi: 10.1037/a0022407

Journal of Personality and Social Psychology

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0022-3514/11/$12.00 DOI: 10.1037/a0022407

A Two-Process View of Facebook Use and Relatedness Need-Satisfaction: Disconnection Drives Use, and Connection Rewards It

Kennon M. Sheldon and Neetu Abad
University of Missouri

Christian Hinsch
Grand Valley State University

Does using Facebook help people to meet their relatedness needs? Study 1 shows that more frequent Facebook usage paradoxically correlates with more relatedness satisfaction (connection) and more relatedness dissatisfaction (disconnection). Study 2 supports a 2-process explanation of this finding, showing that disconnection motivates greater usage as a coping strategy, whereas connection results from greater usage. Study 3 examines the effects of depriving participants of Facebook use for 48 hr. Further supporting the 2-process view, connection decreased, but disconnection was unaffected during the deprivation period; however, those who became more disconnected during the deprivation period engaged in more Facebook use during a 2nd, unconstrained 48-hr period, whereas changes in connection did not predict later use. In Study 4, participants set a Facebook reduction goal; initial disconnection interfered with and predicted worse performance in this goal. Implications for theories of psychological needs, behavioral motives, and adaptive coping are considered.

Keywords: psychological needs, Facebook, relatedness

"Facebooking" has become near-epidemic in college populations (Dretzin & Maggio, 2008; Pempek, Yermolayeva, & Calvert, 2009). For example, Spring 2009 pretest data from the University of Missouri found that 960 out of 1,002 participants (more than 95%) have a Facebook page, and 78% access the site at least twice a day. Does this represent a worrisome new form of "Internet addiction" (Griffiths, 2000; Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009; Young, 1998, 2004), an obsession (Vallerand et al., 2003) that disrupts or consumes peoples' lives? Furthermore, does this electronic sociability, or interaction-at-a-distance, fail to meet people's deeper relatedness needs, given the importance of direct touching, gazing, and smiling for our ancestors (Ben-Ze'ev, 2005)? Or, is Facebook instead a boon, enhancing peoples' ability to connect with each other and to meet their relatedness needs? After all, the Internet was designed as a medium of communication, and social applications associated with Web 2.0 may be contributing to the formation of "social capital" (Ellison, Steinfield, & Lampe, 2007; Mathwick, Wiertz, & De Ruyter, 2008; Steinfield, Ellison, & Lampe, 2008).

Of course, these differing viewpoints represent the two extreme perspectives on the question of Facebook's positive versus negative effects: The reality is likely more complex and nuanced. For example, the current studies were prompted by a discovery that was made in the pretest data mentioned above: that the more participants report using Facebook, the more they feel both relatedness need-*satisfaction* and relatedness need-*dissatisfaction*. Although these data are formally described below as Study 1, suffice it here to say that paradoxically, greater Facebook use was positively correlated with both positively worded indicators of relatedness need-satisfaction (which we call *connection*) and negatively worded indicators of relatedness need-satisfaction (which we call *disconnection*). That is, frequent users felt both more connected *and* more disconnected, more close to others *and* more unappreciated by others, and so on. This was surprising because positive and negative indicators of a construct are typically negatively correlated with each other, and thus negative indicators are typically recoded prior to computation of an aggregate construct measure. How can an activity provide both connection and disconnection at the same time?

Upon reflection, we hypothesized that this cross-sectional correlational pattern may actually reflect two very different processes. The positive correlation of the amount of Facebook use with disconnection exists because people lacking in relatedness go onto Facebook more—disconnection motivates Facebook use as a coping strategy. The positive correlation of Facebook use with connection exists because people who go onto Facebook a lot must be getting something out of it—connection results from Facebook use, rewarding and maintaining such use. Note that one could interpret these two correlations in the opposite way: Relationally connected people might be social people who reach out to others, and thus their sociality might motivate their Facebook use. Or, disconnection might result from the excessive use of Facebook or other social media, as some research suggests (Kim, LaRose, & Peng, 2009; Kraut et al., 1998; Stepanikova, Nie, & He, 2010).

Because of these plausible alternatives, we believe that finding evidence for our version of the two-process model could be a major contribution in disentangling the dynamic motivational and experiential processes underlying this complex social activity. Finding support for our model would also have major implications for existing theories of psychological needs and motives, and the

Kennon M. Sheldon and Neetu Abad, Department of Psychology, University of Missouri; Christian Hinsch, Department of Marketing, Grand Valley State University.

Correspondence concerning this article should be addressed to Kennon M. Sheldon, Psychological Sciences, McAlester Hall, University of Missouri, Columbia, MO 65211. E-mail: sheldonk@missouri.edu

important question of how to distinguish between needs as prior motives (driving behavior) versus needs as resultant experiences (rewarding behavior). Data supporting our model would also have important implications for the coping and addiction literatures.

We approached this question from the perspective of self-determination theory (SDT), utilizing some of its propositions concerning basic psychological needs (Deci & Ryan, 1985, 2000, 2008). According to SDT, human nature contains three inherent psychological needs, experiential nutriments people must have if they are to thrive and mature to the maximal extent. Specifically, humans have evolved needs to feel autonomous (volitional and self-expressive), competent (effective and masterful), and related (close and connected) in their lives and behavior. Much research now supports this proposal, showing that feelings of autonomy, competence, and relatedness, when properly conceptualized and measured, have independent positive effects on well-being, thriving, and performance, in multiple contexts and cultures (Deci & Ryan, 2000; Ryan & Deci, 2008; Sheldon, 2004). In other words, the more people report experiencing these three needs the better they feel and do, just as plants thrive fully when their needs for sun, soil, and water are met (Ryan, 1995).

What influences or produces need-satisfaction? Most SDT research focuses on social context effects, by measuring the extent to which authorities (parents, teachers, bosses, coaches, groups) support versus thwart the satisfaction of the needs of subordinates (children, students, employees, athletes, group members). Thus, SDT research often examines need-satisfaction constructs as mediators that connect particular social contexts to the positive outcomes that result from those contexts. For example, Sheldon and Krieger (2007) showed that one law school (context) better met its students' autonomy and competence needs than a second law school, explaining why student outcomes were better at the first law school.

Although SDT posits three psychological needs, in this research we focused in particular on the need for relatedness, given its relevance for the social activity of Facebooking. Of course, the idea that people need experiences of interpersonal closeness or relatedness is hardly unique to SDT. Indeed, feelings of social satisfaction, security, inclusion, and acceptance are among the most powerful predictors of psychological and physical health (e.g., see Baumeister and Leary's, 1995, review of the importance of what they termed belongingness need-satisfaction). However, we used the SDT perspective upon interpersonal needs because of SDT's strong emphasis on the notion that certain contexts or activities may fail to satisfy people's needs, to their detriment. This allowed us to examine Facebook as a context that may (or may not) satisfy relatedness needs. Thus, the question becomes, are Facebook users thriving or suffering?

To address this issue, we used a somewhat novel perspective on the SDT needs, one that was recently proposed by Sheldon and Gunz (2009). Sheldon and Gunz argued that psychological needs, if they evolved, must be more than mere *outcomes*, derived from the social context, which determine whether a person thrives; they must also be behavioral *motives*, that is, internal forces that prompt ameliorative behavior when a needed experience is missing. For example, a person who currently feels incompetent should make efforts to become more competent (i.e., to master the problem), if psychological needs are to be thought of as innate propensities that are associated with solving specific adaptive problems (Ryan & Deci, 2008). Of course, many other need theories have proposed that psychological needs function as behavioral motives (Brewer, 1991; Hawkley et al., 2008; Maslow, 1954; Murray, 1938). The ideas of Sheldon and Gunz were novel mainly in attempting to apply a needs-as-motives perspective within SDT, but they were also novel with respect to the broader issue of conceptually and empirically distinguishing needs-as-outcome perspectives and needs-as-motive perspectives on psychological needs. We believe the failure to make this distinction has been a significant source of confusion and delayed progress in the psychological needs literature.

Sheldon and Gunz (2009) suggested that their dual approach to conceptualizing psychological needs affords SDT new criteria and avenues for testing and proving its proposed three basic needs, citing Baumeister and Leary's (1995) proposed nine criteria for identifying basic psychological needs: that a fundamental need should (1) produce effects readily under all but adverse conditions, (2) have affective consequences, (3) direct cognitive processing, (4) lead to ill effects (such as on health or adjustment) when thwarted, (5) elicit goal-oriented behavior designed to satisfy it (subject to motivational patterns such as object substitutability and satiation), (6) be universal in the sense of applying to all people, (7) not be derivative of other motives, (8) affect a broad variety of behaviors, and (9) have implications that go beyond immediate psychological functioning. Most SDT research thus far has been outcome-based, using Criterion 1 (that needs readily produce effects), Criterion 4 (that needs cause ill effects when thwarted), and Criterion 6 (that needs are universal across people) to try to establish the singular importance of each need. Sheldon and Gunz's research tested the three needs using Criterion 5 (that needs elicit relevant goal-oriented behavior).

Sheldon and Gunz (2009) found, as predicted, that measured or experimentally manipulated states of low autonomy, competence, and relatedness need-satisfaction were associated with motivation to obtain specific corresponding experiences. For example, those low in autonomy need-satisfaction wanted especially to "create a life-style where others no longer pressure you, and you are free to do whatever you choose"; those low in competence wanted especially to "become very, very good at some activity that is important to you, and feel less inept and incompetent"; and those low in relatedness wanted especially to "meet some great new friends so that you feel really appreciated and understood, and feel less lonely and unappreciated."

Importantly, across the three needs, Sheldon and Gunz (2009) also found that only the *negatively* worded subscales of the need satisfaction scales predicted "wanting," not the positively worded subscales. For example, when the relatedness scale was separated into its positively and negatively worded subscales (connection and disconnection), the motivation to make new friends and relationships was predicted only by the presence of disconnection, and not by the absence of connection. Sheldon and Gunz suggested that this finding is important because it provides a way of integrating homeostatic and growth-based theories of needs. Needs may serve as implicit, ever-present standards guiding behavior, such that the "presence of the negative" apparently motivates discrepancy-reduction efforts, in a negative feedback process (Carver & Scheier, 1998). Such a process is essentially homeostatic; reductions from a baseline set-point energize ameliorative activity. However, Sheldon and Gunz's findings also suggested that the

presence of a positive experience does not necessarily mean that we want less of that experience; we would still like that positive experience, but no more than anybody else. Such a process is apparently not homeostatic; one does not become "sated" by positive experiences, wanting them less and less when they are present (which would represent a negative feedback process), and one does not become sensitized to them, wanting them more and more when they are present (which would represent a positive feedback process). In short, Sheldon and Gunz found that dissatisfaction (presence vs. absence of the negative) motivates behavior, and satisfaction (presence vs. absence of the positive) does not.

If positive need satisfaction does not influence current motivation, where and how does it fit within the behavioral process? In this research, we surmised that satisfaction *results* from successful motive-relevant behavior, a process that was not measured by Sheldon and Gunz (2009), who concluded their investigation at the point of desiring, without investigating subsequent outcomes. Thus, in the current research, we tried to extend Sheldon and Gunz's dynamic perspective by testing hypotheses regarding both the causes and the consequences of Facebook use. We hypothesized that Facebook use results from dissatisfaction (specifically, the presence of disconnection drives Facebook use), just as motivations to approach needs resulted from dissatisfaction in Sheldon and Gunz's data. Also, we hypothesized that connection results from Facebook use, serving to reinforce that use. Study 1 tests these hypotheses.

Study 1

Method

Participants and procedure. Participants were 1,002 introductory psychology students at the University of Missouri, 436 men and 563 women (three participants did not identify their gender), who took part to help fulfill a research requirement. From a course web-page, they linked to a "mass pretest" online survey that contained a variety of measures. Here, we focus only on the relatedness need-satisfaction measure and a Facebook use measure.

Measures. To measure relatedness need-satisfaction, we used the six items employed by Sheldon and Gunz (2009) and Sheldon, Cummins, and Khamble (2010), asking participants to rate their experience "during the last week," using a scale ranging from 1 (*not true*) to 9 (*very true*). The three positive (connection) items were "I felt a sense of contact with people who care for me, and whom I care for," "I felt close and connected with other people who are important to me," and "I felt a strong sense of intimacy with the people I spent time with." The three negative (disconnection) items were "I was lonely," "I felt unappreciated by one or more important people," and "I had disagreements or conflicts with people I usually get along with."

As a preliminary measure validation, the six relatedness items were subjected to a principal axis factor analysis with oblique rotation. They formed two clear factors (first two eigenvalues of 2.31 and 1.62, with a third eigenvalue of only 0.72) that were loaded on by either the positive or negatively worded items (for the pattern matrix, all expected loadings were .52 or more, with no cross-loadings exceeding .16). The two factors correlated at –.14. Essentially the same results emerged using principal components extractions and orthogonal rotations. Accordingly, connection ($M = 6.91$, $SD = 1.67$; $\alpha = .76$) and disconnection ($M = 4.18$, $SD = 1.96$; $\alpha = .65$) scores were computed for each participant.

Facebook use was assessed by the item "How often do you view information through the MySpace and Facebook sites (combine numbers, if you use both)."[1] The categories provided were (a) "I don't use" ($n = 42$), (b) "once a week" ($n = 56$), (c) "every couple of days" ($n = 122$), (d) "just about every day" ($n = 284$), and (e) "more than once a day" ($n = 498$). Thus, 96% of participants use Facebook, 78% of them every day. Facebook use was treated as a continuous variable.

Results

Disconnection was positively correlated with amount of Facebook use at $r = .13$, $p < .01$, as was connection at $r = .10$, $p < .01$. To assess unique variances and formally test hypotheses, we regressed Facebook use on both disconnection and connection simultaneously; in this analysis, the standardized coefficients were .15 and .12, respectively (both ps $< .01$). Entry of a product interaction term at the second step of this regression indicated that there was no interaction between connection and disconnection in predicting amount of usage. We also examined the effects of participant gender. Although women used Facebook more (Ms = 4.31 vs. 3.92), $t(997) = 5.74$, $p < .001$, and were also higher in both connection (Ms = 7.23 vs. 6.50), $t(997) = 7.08$, $p < .01$, and disconnection (Ms = 4.32 vs. 3.97), $t(997) = 2.86$, $p < .01$, the disconnection and connection effects on Facebook use remained significant when gender was controlled. Also, gender interacted with neither connection nor disconnection in predicting amount of Facebook use.

Discussion

Study 1 established a somewhat counterintuitive pattern of relationships, in which greater Facebook use was associated with both disconnection and connection, although disconnection and connection were themselves negatively correlated. Thus, although Facebook use was unrelated to a typical aggregated measure of relatedness need-satisfaction ($r = -.03$), a separate examination of the positive and negatively worded subscales of this measure suggested that the positive and negative facets of relatedness merit separate consideration. These results raise the important question of causality: Is Facebook use perhaps *causing* states of both connection and disconnection, providing mixed benefits, or is Facebook use *caused by* both states of connection and states of disconnection, as a motivated response to these states? Or, is one of the two feelings a cause of high Facebook use and the other an effect, or neither?

Again, in this research we hypothesized that prior disconnection drives high use, and that high use is rewarded and maintained by subsequent connection. Study 2 provides a preliminary test of these dynamic hypotheses within a cross-sectional design. A first objective of Study 2 was to replicate the Study 1 finding that the

[1] Study 1 contained reference to MySpace because high school students are somewhat more likely to use MySpace, and this sample was almost entirely freshmen. However, later studies remove MySpace from the frequency item because it became apparent that very few students use it.

amount of Facebook use is positively associated with both connection and disconnection. The second and main objective of Study 2 was to examine the mediators of these associations. If dissatisfaction motivates Facebook use such that greater use represents a response to dissatisfaction, then the relationship between general dissatisfaction and Facebook use should disappear when a measure of "Coping via Facebook" (created for use in this study) is entered into the equation. In other words, if the reason dissatisfaction correlates with amount of Facebook use is that Facebook use is an attempt to reduce dissatisfaction, then this correlation should decrease when Facebook-based dissatisfaction-coping is partialled out of the association. Conversely, if connection results from Facebook use and rewards such use, then the relationship between Facebook use and general connection should disappear when a measure of "connection within the Facebook activity" is entered into the equation. In other words, if the reason the amount of Facebook use is correlated with general connection is that more specific connection results from more use, then the general connection correlation should decrease when a more specific version of the general connection measure, one that is targeted to the Facebook context only, is partialled out of the association. These two patterns would offer conceptual if not yet causal support to our hypotheses.

Study 2

Method

Participants and procedure. Participants were 96 introductory psychology students at the University of Missouri, 30 men and 66 women, who signed up for an Internet survey of regular Facebook users. They were sent the link to the survey and completed it at their own convenience.

Measures. The same Facebook use item was used in Study 2 as in Study 1. All participants reported using Facebook, and 83% of participants reported more than daily Facebook use (compared with 78% in Study 1). Also, the same connection and disconnection need-satisfaction items were used, although with a 5- rather than a 9-point scale. Again, general connection ($\alpha = .78$) and disconnection ($\alpha = .71$) scores were computed by averaging the relevant items. To measure "Coping via Facebook," we asked participants to rate the following item: "When I am feeling lonely or out of touch with others, I typically go on to Facebook," using a scale ranging from 1 (*much disagreement*) to 3 (*neutral*) to 5 (*much agreement*). To measure positive and negative social experiences *within* the Facebook activity, we administered the six relatedness need-satisfaction items, modified to fit the Facebook context. For example, in addition to rating the general connection item "I felt close and connected with other people who are important to me" with reference to "the last few weeks," participants also rated that item with reference to how they feel "when I am using Facebook." Facebook-specific disconnection ($\alpha = .69$) and connection ($\alpha = .79$) scores were computed from these six ratings, to be used as measures of reinforcement within the Facebook context.

Results

First, we sought to replicate the Study 1 findings. Consistent with those results, Facebook use was positively correlated with both connection ($r = .20$, $p < .05$) and disconnection ($r = .17$, $p < .10$; see Table 1 for descriptive statistics and correlations). To assess unique variances and formally test hypotheses, we regressed Facebook use on both disconnection and connection simultaneously; the standardized coefficients were .21 and .24, respectively (both ps $< .01$). Entry of a product interaction term at the second step of this regression once again found no interaction between connection and disconnection in predicting amount of usage. We also examined the effects of participant gender. Women again used Facebook more (Ms = 4.59 vs. 3.80), $t(94) = 4.47$, $p < .001$, and were higher in connection (Ms = 4.08 vs. 3.67), $t(94) = 2.31$, $p < .05$, but in this study did not differ from men in disconnection. Most importantly, gender interacted with neither connection nor disconnection in predicting amount of Facebook use.

Next, we examined the two prospective mediators, "Facebook to cope," and "Satisfaction within Facebook." Consistent with our mediational hypotheses (Baron & Kenny, 1986), Table 1 illustrates that general disconnection is positively correlated with Facebook to cope, that Facebook to cope is positively correlated with Facebook use, that Facebook use is positively correlated with connection within Facebook, and that connection within Facebook is positively correlated with general connection. We used Baron and Kenny's (1986) procedure and Sobel's (1982) test of mediation to first test whether the association between disconnection and Facebook use is mediated by Facebook to cope. The disconnection coefficient was reduced from .17 to .09 ($Z = 1.93$, $p = .05$), and the mediator, Facebook to cope, was itself significant (.31, $p < .01$). In contrast, Facebook to cope could not mediate the association between connection and Facebook use, because connection was unrelated to Facebook to cope (see Table 1). We then used a similar procedure to test whether the association between Face-

Table 1
Study 2: Descriptives and Correlations Among Primary Study Variables

Variable	*M*	*SD*	1	2	3	4	5
1. Connection	3.95	0.83					
2. Disconnection	2.60	0.99	−.19†				
3. FB to cope	3.22	1.12	.03	.25*			
4. FB satisfaction	3.09	0.98	.18†	.16	.28**		
5. FB dissatisfaction	1.99	0.85	−.28**	.21*	.22*	.26**	
6. FB frequency	4.34	0.88	.20*	.17†	.33**	.27**	−.12

Note. FB = Facebook.
† $p < .10$. * $p < .05$. ** $p < .01$.

book use and general connection is mediated by Facebook-specific connection, also including Facebook-specific disconnection in the equations to assess unique variances. The general connection coefficient was reduced from .20 to .10, a near-significant reduction ($Z = 1.83$, $p < .07$). The Facebook-specific connection coefficient was significant ($\beta = .23$, $p < .05$), as was the Facebook-specific disconnection coefficient ($\beta = -.32$, $p < .01$). However Facebook-specific disconnection was not tested as a mediator because Facebook-specific disconnection was unrelated to Facebook use (see Table 1). This result is consistent with our resultant experience interpretation of the connection to Facebook use association, suggesting that connections follow from and reward usage. In other words, people who use Facebook a lot may be getting something from it, as we might expect.

Discussion

Study 2 replicated the curious finding that inspired this research, namely, that the amount a person uses Facebook is positively associated with both disconnection and connection. Study 2 also provided preliminary data supporting our proposed two-process interpretation of these findings. Specifically, the association between disconnection and Facebook use was largely explained by a measure of "using Facebook to cope with disconnection," and the association between Facebook use and connection was largely explained by measures of participant's positive experiences within the context of Facebook use. In line with our original theorizing, disconnection may drive Facebook use (as a coping strategy), and connection may result from Facebook use (as a reward).

However, Study 2 was still only cross-sectional, and thus causal interpretations of the data must be made with great caution. In Study 3, we used a three-wave longitudinal design to better test our hypotheses. Specifically, Facebook users were assessed at Time 1, then were asked to refrain from going to Facebook for a 48-hr period, were assessed at the end of this period, and were assessed a third time 48 hr later. This allowed us to examine three questions: (a) Would baseline disconnection and connection both be associated with baseline Facebook usage, replicating the earlier findings? (b) Would participant's feelings of connection decline during the cessation of activity, as would be expected if connection is a consequence of Facebook activity? And, (c) would increases in disconnection during the cessation period predict higher levels of usage during a second 48-hr period, as would be expected if acute disconnection is a significant cause of high levels of Facebook use? This study design is consistent with those used in other studies of addiction and relapse (i.e., Wetter, Fiore, et al., 1999; Wetter, Kenford, et al., 1999), essentially using participants as their own controls in an ABA design so that the effects of both ceasing an activity and returning to that activity can be examined.

Study 3

Method

Participants and procedure. Initial participants were 98 participants, 36 men and 33 women, who took part to help fulfill a course research requirement.[2,3] Current Facebook users were directed to an Internet-based sign up system for a study titled "Online Survey of Facebook User's Attitudes." The study description informed potential participants that the study involved three assessments and that they might be asked to cease activity for a short time. After signing up they were sent a link to the first survey, which assessed their baseline frequency of usage and their relatedness need-satisfaction. All participants were then instructed about a 48-hr "no use" restriction and were asked to click their consent to this restriction. Forty-eight hours later (at Time 2), all participants were sent a link to a follow-up survey that again assessed relatedness need-satisfaction, and then informed participants they were at liberty to return to the medium (87 participants completed Survey 2). Forty-eight hours after that, they were sent a link to a second follow-up survey, which assessed their Facebook usage during the second period (Time 3). Notably, a Qualtrics server error resulted in an inability to match some Time 3 participants with their original data. Thus, *N* was only 62 for Time 3. As expected given the random nature of this error, attrition analyses revealed that these 62 participants were no different from the remaining 34 initial participants on any of the Time 1 variables. We tested our study hypotheses using the available *N* for each hypothesis.

Measures. Connection and disconnection were measured via the same six-item scale as before, at both Time 1 and Time 2 and with respect to "the last 48 hours" (αs for connection = .67 and .63; αs for disconnection = .59 and .65, respectively). Connection and disconnection within the Facebook context were not assessed (as in Study 2) because no usage was to occur during the cessation period. Baseline usage at Time 1 was assessed with a "frequency of use" item similar to those used in the earlier studies, with somewhat different categories ("once a week," "every couple of days," "just about every day," "2–5 times a day," and "more than 5 times a day"). We expanded the assessment of the upper part of the range on the basis of the somewhat skewed distributions observed in Studies 1 and 2. Facebook use during the second, unrestricted 48-hr period was measured with two items: "In the last 48 hours, how much combined time did you spend using Facebook?" ("less than 1/2 hour," "1/2 to 2 hours," "2 to 4 hours," "4 to 6 hours," and "more than 6 hours") and also, "in the last 48 hours, what percentage of your discretionary time (free time) did you spend actively engaging in Facebook?" (0%–100%). These two measures were highly correlated and were standardized and combined ($\alpha = .77$). Finally, we asked participants at Time 2 if they had gone to Facebook during the deprivation period, also informing them that their credit for the study would be unaffected by their answer. Of 87 participants with Time 1 and Time 2 data, 20 admitted having logged on to Facebook at least once, that is, they violated study instructions. However the pattern of significant results was unchanged whether these 20 participants were included, and 18 of the 20 violators reported having logged on only once or less than usual. Thus, we left the 20 participants in the data set under the assumption that they at least reduced their usage.

[2] Thirty-nine participants did not have gender data because gender was not assessed until Time 3 and because there was a data-matching error at Time 3 (see Footnote 3).

[3] Sheldon and Hinsch (2010) reported data from the same two samples as those reported in Studies 3 and 4 of this article. However, none of the same variables are reported.

Results

To replicate the earlier findings, we regressed baseline Facebook usage upon both Time 1 disconnection and connection, using the full sample. Once again, both variables were positively associated with baseline usage (βs = .22 and .32, respectively; ps < .05 and .01, respectively), suggesting a paradox that needs explaining.

To examine the changes that occurred during the cessation period, we conducted paired t tests on the disconnection and connection variables. Connection declined during this period (Ms = 11.60–11.05), $t(86) = 2.51$, $p = .01$, and disconnection was unchanged during this period (Ms = 7.48–7.07), $t(86) = 1.37$, *ns*. Thus, it appears that losing the use of Facebook caused reduced connection but did not cause increased disconnection. This supports our second hypothesis, that connection is a result of and not a cause of Facebook use.

To test our third hypothesis, that acute changes in disconnection may drive increased Facebook usage, we regressed Time 3 Facebook use upon Time 1 disconnection and connection and Time 2 disconnection and connection. We hypothesized that T2 disconnection (representing T1 to T2 change in disconnection, because T1 disconnection was in the equation) would be significantly positively associated with amount of usage from T2 to T3, and that change in connection would *not* be associated with usage from T2 to T3. This is what we found: T2 disconnection predicted Time 3 usage at $\beta = .31$, $p < .05$, whereas the coefficients for T2 connection, T1 connection, and T1 disconnection were only .11, .11, and –.13, respectively (all ps > .40). We also controlled for baseline frequency of usage in an additional step of this equation, with no change in results; the standardized coefficient for T2 disconnection remained significant at $\beta = .32$, $p < .03$, and the other coefficients remained nonsignificant (baseline frequency, the test–retest coefficient, was also a significant predictor in this analysis, $\beta = .36$, $p < .01$; total R^2 for the equation was .23, $p < .02$). This indicates that those who experienced larger increases in disconnection during the cessation period engaged in more usage during the free choice period, even compared with their Time 1 baselines. In sum, although the mean level of disconnection did not change between T1 and T2, variations in disconnection change between T1 and T2 predicted variations in Facebook use between T2 and T3.

Discussion

Study 3 provided stronger support for our research hypotheses using an experimental design in which all participants refrained from using Facebook for 48 hr. Once again, disconnection and connection were both positively associated with baseline Facebook usage, prior to cessation. However, results support our dynamic interpretation of these effects by showing that only connection declined during the cessation period (i.e., connection results from Facebook use), whereas only changes in disconnection predicted greater usage during the 48 hr following the cessation period (i.e., disconnection drives Facebook use).

In Study 4 we endeavored to test our hypotheses in a new way, by asking participants to set a goal to reduce their Facebook use. We reasoned that disconnected participants who accept this offer might find themselves involved in a motivational conflict: One the one hand they want to use Facebook to cope with their disconnection, but on the other hand, they have promised to try to reduce their Facebook use. As a result of this conflict or competition between motives, disconnected participants should set a lower reduction goal and also perform more poorly in their reduction goal, regardless of the amount of reduction sought. In contrast, Time 1 connection is not a motive and should not directly conflict with the Facebook reduction goal. Thus, Time 1 connection should not predict less ambitious goal-setting or poorer goal performance. Instead, Time 2 connection should decrease as a function of the degree of Facebook reduction that has occurred during the reduction period.

Study 4

Method

Participants and procedure. Initial Study 4 participants were 94 Introductory psychology students fulfilling a course research requirement, who read a study description that said "To be eligible for this study, you must use Facebook and be thinking about reducing the amount of time that you spend doing this activity." Thus, to take part in the study, participants (59 women, 35 men) had to be regular users who might have some concerns about using Facebook too much. Volunteers were sent a link to an Internet survey. The first page described the research as

> a study of Facebook users who are considering cutting down on their usage. Near the end of this survey you will be asked to state, Yes or No, whether you want to try to cut back. Your credit for participating in this study does not depend on whether you actually try, or succeed at, cutting down your Facebook use.

Baseline disconnection and connection were assessed, and then participants were asked whether they were willing to set a reduction goal. The 78 participants (76%) who clicked "yes" to this question constitute the sample for this study, and they did not differ from the 16 "no" responders in baseline Facebook usage, connection, or disconnection. After clicking "yes," the 78 participants specified the degree of usage reduction sought. Forty-eight hours later they were sent a link to a second questionnaire that reassessed the study variables.

Measures.

Repeated from earlier studies. Time 1 and Time 2 disconnection and connection were assessed with the same six items used in the first three studies. We measured baseline usage by asking "in an average day, how much time do you spend actively using Facebook?" Nine time categories were provided, ranging from "less than 10 minutes" to "10–20 minutes" to "20–30 minutes" to "30–45 minutes" to "45–60 minutes" to "1–2 hours" to "2–3 hours" to "3–5 hours" to "more than 5 hours." This same measure was provided again at Time 2.

Reduction goal. After agreeing to set a reduction goal, participants first read "I would like to set a goal to reduce my time on Facebook to the following amount . . . " and were then presented with goal options corresponding to the nine baseline usage categories used above, plus a "none, I would like to quit completely" category. Each goal category was tailored to represent reduction from a matched baseline usage category; thus, setting a goal to "quit completely" represents cutting back one category from the

most minimal usage category of "less than 10 minutes a day," whereas setting a goal to reduce to "less than 10 minutes a day" represents cutting back one category from the second-most minimal usage category of "10–20 minutes a day," and so on. After correcting for the additional category provided for the goal-setting question, analyses revealed that on average, participants chose a goal target that was 2.013 categories less than their baseline usage. A paired sample *t* test revealed that this difference was significant, $t(76) = 5.73$, $p < .01$, suggesting that participants took the study request seriously.

Results

Mean baseline usage was 5.27, representing slightly more than 1 hr a day. Usage was reduced during the striving period from 5.27 to 3.42—the latter mean represents between 30 and 45 min a day, $t(77) = 10.27$, $p < .01$—indicating that participants successfully reduced their usage, on average.

To test the hypothesis that baseline disconnection predicts poorer goal performance, we regressed T2 time spent on Facebook upon T1 disconnection and connection. As hypothesized, T1 disconnection was significant in this analysis ($\beta = .34$, $p < .01$), and T1 connection was not ($\beta = .12$, *ns*); thus, lonelier people, at baseline, spent more time on the site between Time 1 and Time 2 compared with less lonely people. We next entered baseline usage into this equation, to examine whether T1 disconnection predicts greater usage relative to baseline. Baseline usage (the test–retest) coefficient was significant at $\beta = .55$ ($p < .01$). More importantly the disconnection and connection coefficients were .22 ($p < .05$) and .08 (*ns*), respectively, suggesting initial disconnection may even increase usage relative to one's own baseline, and relative to the rest of the sample.

We also examined the degree of goal set. How *much* were participants trying to cut back, as a function of their initial disconnection? To examine this we regressed reduction goal upon T1 disconnection and connection, finding that greater initial disconnection predicted less ambitious goal-setting ($\beta = -.33$, $p < .01$), and greater connection did not ($\beta = -.06$, *ns*). It appears that the strength of the disconnection-based motive to use Facebook works to minimize the ambitiousness of a new motive to reduce usage.

Finally, we examined the effects of Facebook usage during the reduction period upon changes in connection and disconnection. First, we regressed T2 connection upon T1 connection and usage during the reduction period, then we regressed T2 disconnection upon T1 disconnection and usage during the reduction period. We also added baseline usage at a second step of both equations. Counter to hypotheses, usage during the reduction period did not predict change in connection ($\beta = -.04$, *ns*). However consistent with hypotheses, reduction period usage also did not predict a change in disconnection ($\beta = .05$, *ns*). These patterns were unchanged when baseline usage was controlled.

Discussion

In Study 4, we reasoned that relationally dissatisfied participants would have more difficulty setting and doing well in a Facebook reduction goal, because disconnection induces a coping motive that works against the induced reduction goal. This is what we found, as participants higher in disconnection at Time 1 set less ambitious reduction goals and also performed less well in those easier goals. Unexpectedly, greater use during the reduction period did not predict enhanced connection following this period. We speculate that "using more" during the reduction period corresponds to "failing in the study goal," which may disrupt people's normal positive responses to usage. Still, Study 4 provided clear new support for the idea that disconnection has causal effects upon Facebook use. Here, the motivational status of disconnection apparently interfered with a usage reduction goal.

General Discussion

We begin with a synopsis of the study results. This research started with the curious and perhaps paradoxical observation that the frequency of Facebook use is positively correlated with feelings of general connection in life *and* with feelings of general disconnection in life (Study 1). In Study 2, we replicated this pattern and found support for the idea that these two cross-sectional correlations result from two different processes by showing that the correlation of disconnection with Facebook use is mediated by the tendency to cope with disconnection via Facebook, and that the correlation of connection with Facebook use is mediated by the tendency to have positive experiences within the Facebook context. Thus, general disconnection may motivate Facebook use, and connection may reward it. In Study 3, we found that "going cold turkey" for 48 hr caused a reduction in connection but not in disconnection during this period, and that becoming more disconnected (but not less connected) during this period caused increased use of Facebook during a subsequent free period. This further supports the two-process interpretation, as depriving participants of the activity led to reductions of the associated reward (connection), and becoming more dissatisfied with relatedness during this period (for whatever reason) led to extra motivation to go back to Facebook. In Study 4, we found that disconnected participants set a less ambitious Facebook reduction goal, and they did more poorly in even this reduced level of goal. Apparently, salient disconnection supplies a motive that depresses performance in a goal counter to that motive.

These studies have interesting implications for a number of issues, including theories of basic psychological needs, theories of addiction and coping, and theories to explain the popularity yet potential downsides of social networking. We discuss these issues in turn. Regarding psychological needs, the results support Sheldon and Gunz's (2009) suggestion that the psychological needs specified by SDT can function as instigating motives as well as experiential outcomes, as it seems they must if psychological needs evolved to solve adaptive problems. This idea represents an extension of SDT's basic psychological needs theory, offering at the very least new opportunities to validate SDT's claims regarding which experiences are really needs. This perspective also offers new ways of integrating the SDT needs perspective with other need theories, such as the motive disposition perspective upon needs (McClelland, 1985), which also focuses on needs as motives rather than as outcomes (see Sheldon & Cooper, 2008; Sheldon & Schuler, 2010). The proposition that people are not simply enervated when their needs are not met, but rather, that they can and do take action in response, provides important new avenues for conceptualizing adaptive and maladaptive behavior within SDT. In the current data, the presence of disconnection apparently

motivated Facebook use as a coping response. This is consistent with the findings of Kim et al. (2009), Stepanikova et al. (2010), and Kraut et al. (1998), who found that Internet use (including social Internet use) may be a response to loneliness or distress.

Were such responses effective? It appears the answer is "yes and no." The more participants use Facebook, the more connection they report feeling in life. In terms of conventional SDT, Facebook use helps satisfy people's positive relatedness needs, which explains why they use Facebook and suggests that use is primarily beneficial. However, clearly distinguishing between connection and disconnection supplies a caveat to this conclusion: Disconnection is not decreased by Facebook use. Thus, it is possible that a lonely person may gain transient positive feelings while using Facebook but may not solve underlying real-life social problems that gave rise to feelings of loneliness or disconnection; ultimately, those problems may even get worse (Kim et al., 2009). The portrait that arises is of a person who is addicted to a coping device that does not approach problem-resolution directly but, rather, approaches a pleasant distraction from problems.

Such a scenario has been discussed in the addictions literature, which has long linked stress to engagement in self-destructive behavior such as drug and alcohol abuse, gambling, or excessive risk-taking (Holahan, Moos, Holahan, Cronkite, & Randall, 2001; Kassel, 2010; Leith & Baumeister, 1996; Valentino, Lucki, & Van Bockstaele, 2010). Individuals suffering from an addiction often report turning to the substance to temporarily boost positive affective states (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; Carmody, Vieten, & Astin, 2007; Leith & Baumeister, 1996; Valentino et al., 2010). Some addictions researchers have recently observed these same patterns associated with excessive Internet usage, making Internet addiction among the newest escape tools available to individuals seeking to experience relief from a variety of negative feeling states (Griffiths, 2000; Meerkerk et al., 2009; Young, 1998, 2004). It is possible that individuals in our study are following a similar pattern of behavior in which feelings of disconnection motivate Facebook use, but this Facebook use does not address or "cure" the initial feelings of disconnection.

Perhaps this helps explain the booming popularity of social networking activities such as Facebooking. Such activities offer an easy and painless route toward a social experience that people need, a route that indeed supplies positive feelings but that does not manage to replace more concrete social relations. In other words, a person who is suffering in the real social world will probably not solve his or her problem by retreating constantly to Facebook (Kim et al., 2009). Supporting this idea, Sheldon and Hinsch (2010) found that reduction in Facebook use was associated with reduced aggression, procrastination, and negative affect, and with increased life-satisfaction, but it was also associated with reduced positive affect. Their findings imply that frequent users may be hooked on a source of transient positive affect gained through this ersatz sociality (Green & Brock, 1998), at an unrecognized cost to their lives as a whole.

Another implication of the current study findings is that social networking does not actually disconnect people, as some critics have argued (Kraut et al., 1998; Stepanikova et al., 2010). Disconnection did not result from Facebook use; instead, our longitudinal studies show that it motivated Facebook use. Also, to complete the picture, feelings of connection did not cause more Facebook use, as in the notion of a highly social person who uses Facebook as an expression of that sociality. Satisfaction results from Facebook use, rather than causing it. As noted in the introduction, we believe that our model sequence, and the findings that support it, can help to untangle the complex dynamics of these processes.

If acute feelings of connection do not cause subsequent motivated behavior, then how *do* such feelings affect future behavior? Although this question is not directly addressed in the current research, we suggest that having many specific rewarding feelings within a particular domain increases the probability that the Facebook domain will be selected the next time a general deficiency is felt. For example, a new user might feel excited and rewarded by his/her first few Facebook interactions, such that the next time he/she feels lonely in the world he/she is likely to go back to Facebook, instead of his/her usual response of trying to initiate a face-to-face conversation with someone. However, as our studies have shown, utilizing Facebook will most likely not decrease his/her feelings of disconnection.

Still, it is important to point out that the "two processes" (needs as motives and as outcomes) underscored by this research are not necessarily playing out in the same people. Doubtless, some people who use Facebook a lot simply get many positive rewards from it, and they do not develop a reliance on it as a coping mechanism. Also, those who frequently cope via Facebook are not necessarily the ones getting the most positive experiences with use, perhaps because their activity may have crossed a line to become an obsessive rather than a harmonious passion for them (Vallerand et al., 2003). It is also likely that the nature of the linkage between the two processes depends on many other factors, such as the type of Facebooking engaged in (responding positively to others, or responding negatively to others; Joinson, 2007), the nature of the person's social support network outside of Facebook (healthy and substantial, or impoverished; Bessière, Kiesler, Kraut, & Boneva, 2008), whether online relationships stimulate offline relationships or instead displace them (Valkenburg & Peter, 2009), and personality characteristics such as extraversion or introversion (Kraut et al., 2002).

Additional study limitations include the reliance on undergraduate samples. It may be that this population is most "addicted" to the medium, and that older people with Facebook pages do not experience the same dynamics. On the other hand, it may be that older people can come to rely just as much on Facebooking for coping with disconnection, or that they find the activity just as rewarding when they do it a lot (Bessière et al., 2008). This is an empirical question that we are now examining. It will also be important for future research to examine cross-cultural generalizability, as social networking is a worldwide phenomenon that may have similar or different effects depending on the type of culture of the individual. We are now collecting similar data in India, which may help to address this issue. Finally, our measures of Facebook use, disconnection, and connection were all based on self-report. Future research might objectively assess usage or might rely on observer reports of participants' state of mind before and after a session of Facebook.

In conclusion, in this research we have found support for a complex yet intelligible explanation of the dynamic processes underlying frequent social networking activity. Overall, Facebook use appears to be a positive phenomenon, although perhaps not as positive as face-to-face sociality. However, Facebook may also

offer an overly tempting coping device for the lonely, one that feels good but does not actually address underlying feelings of social disconnection in life.

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Received May 12, 2010
Revision received October 18, 2010
Accepted December 3, 2010 ■